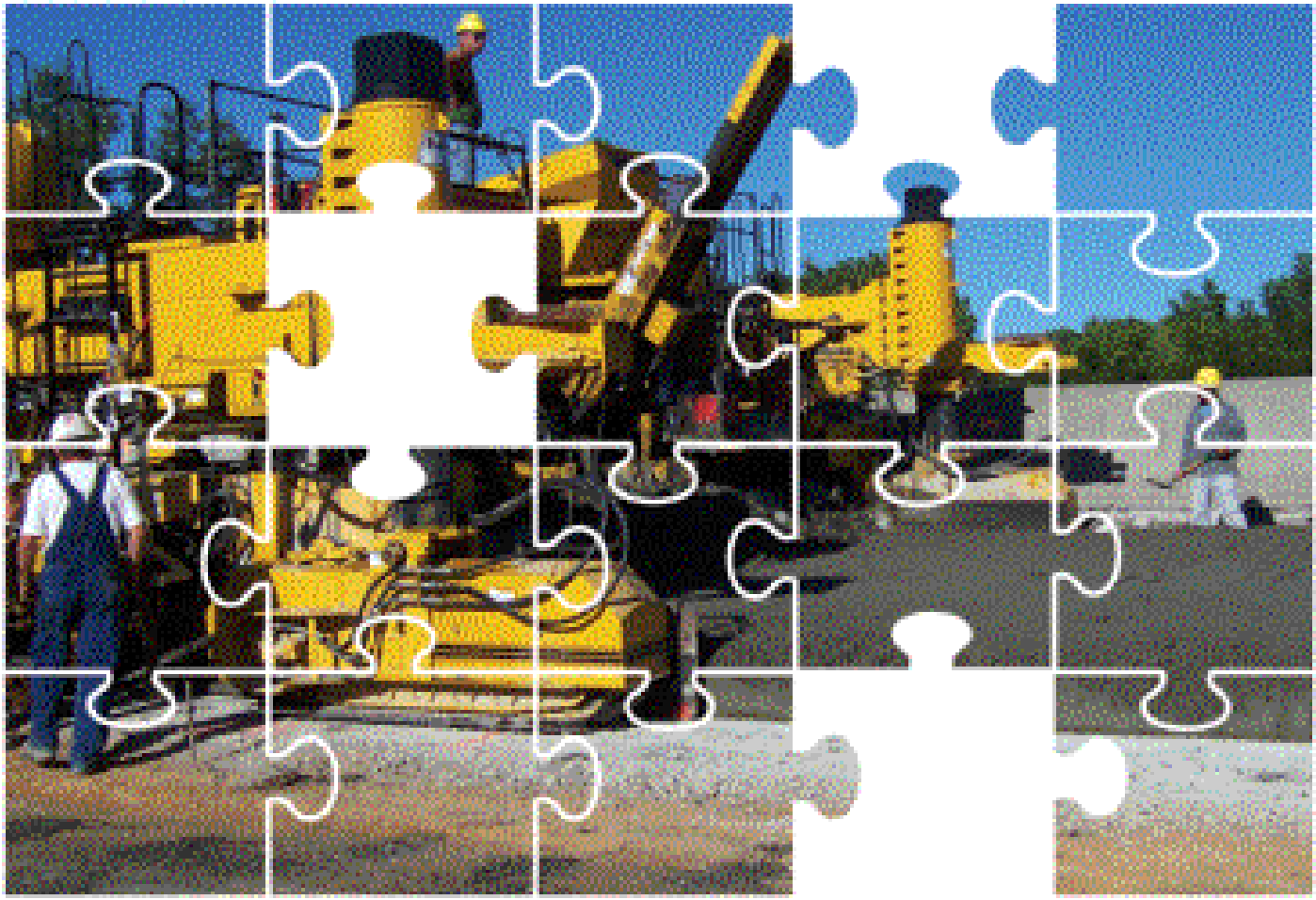
National Concrete Pavement Technology Center

Uniting agencies, industry, and researchers to advance concrete pavement technology

Ted Ferragut
Virginia Concrete Conference
March 10, 2006

PCC paving is a integrated system that still has knowledge gaps



A National Plan

A National Center

What is the National Plan?

The CP Road Map

Comprehensive, collaborative, strategic plan for concrete pavement research and technology

Research Plan Summary

- 12 tracks
- 250 problem statements
- $250M
- 10 years

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Unifying Vision of the Plan

By 2015, the highway community will have a comprehensive, integrated, fully functional system of concrete pavement technology that provides innovative solutions for customer-driven performance requirements

CP Road Map Vision

Mix & Materials

Design

Construction

Pavement Management / Business Systems

Hallmarks of the Plan

Not

- Owned by any organization
- Tied to any one fund

- Promotes cooperation and synergy
- Leverages ideas and funds
- Merges research and implementation

Unity through common goals

Need for National Center

Yesterday …

- Sketchy plan
- Minimal resources
- No unifying organization

The National Center

- Center for Transportation Research & Education at Iowa State University (Formally PCC Center)
- ACPA Endorsement
- Collaborative philosophy
- Administrative and support capabilities

What the Center Is Not

Not Managing all research

Not Controlling all research

Not Sponsoring all research

Not Banking all research

Not Issuing all proposals

What the Center Is

Is Informing community

Is Facilitating partnering

Is Helping move forward

Is Help accelerate implementation

Center is Research and Technology aid to help researchers and implementers access the right resources and partnerships

What the Center Is

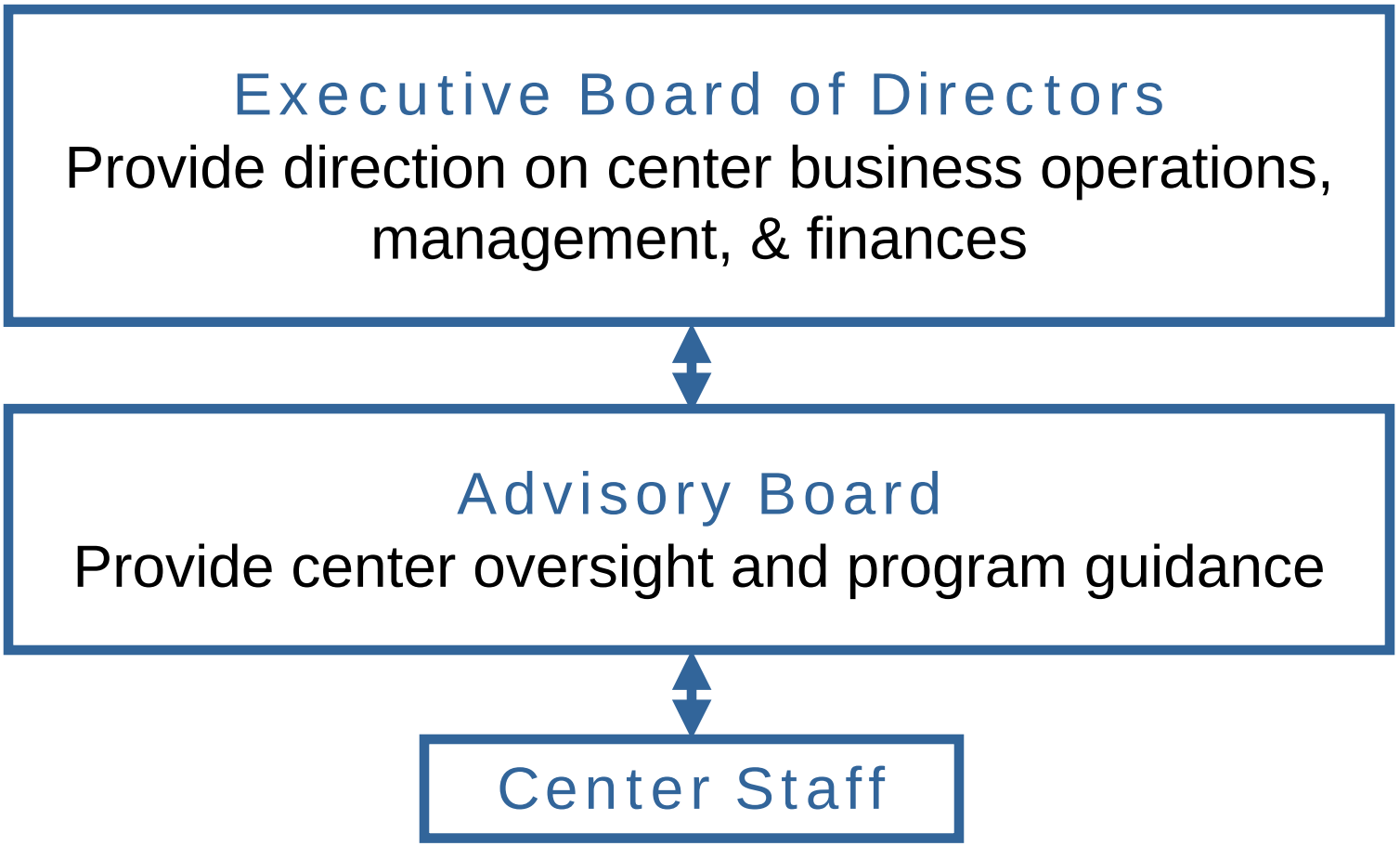
Orchestra leader:

helping everyone

stay in harmony

Unity through Common Goals

Operating Structure



Advisory Board

- FHWA
- FAA
- TRB
- State DOTs / AASHTO
- Iowa DOT
- Academia
- Iowa State University
- Tri-Services
- NACE
- APWA
- ACPA
- State paving chapters / associations
- ICPA
- PCA
- NRMCA
- NSSGA
- IGGA
- Fly ash & slag industries
- Chemical additive industry
- Equipment industry
- Reinforcement industry

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SAFETEA-LU 2005-2009

Concrete pavement research funds

- $10.0M - National Center
- $16.4M - Research

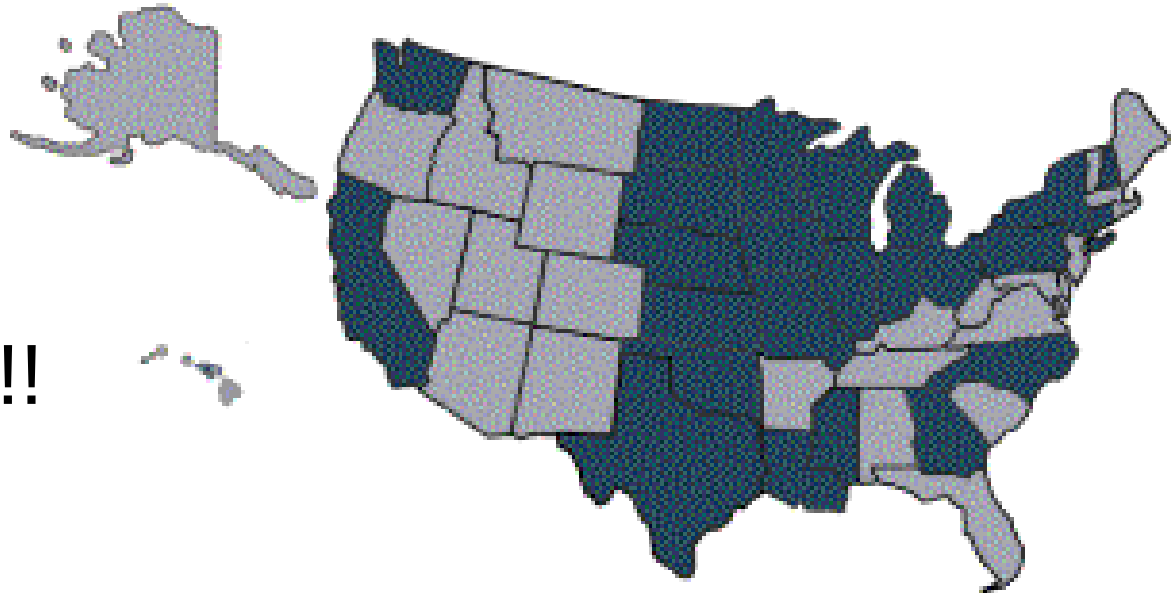
Administration

- FHWA
- National Center

Leverage!!

CP Tech Center Vision

Collaborate!!



Implement!!

Strategic Focus Areas

1. Mix Analysis
2. Surface Characteristics
3. Concrete Overlays
4. Long-Life Pavements

Fire and Ice Sessions

Hot Topic Roundtables

Initial Ideas

- ICS – Intelligent Construction Systems for Concrete Pavements
- PENNDOT – Validating Changes

1. Performance-based Mix Design and Analysis System

- Mix Optimization and Proportioning Guide
- Lab Equipment of the Future
- Regional and National Criteria
- Integration with design and field quality control

Analyze for:

- Compatibility of Materials
- Environmental influences
- Cracking
- Early set
- ASR
- Curling and Warping Potential
- New materials, including variability

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UNDERWAY

Mix Analysis

Material & Construction Optimization

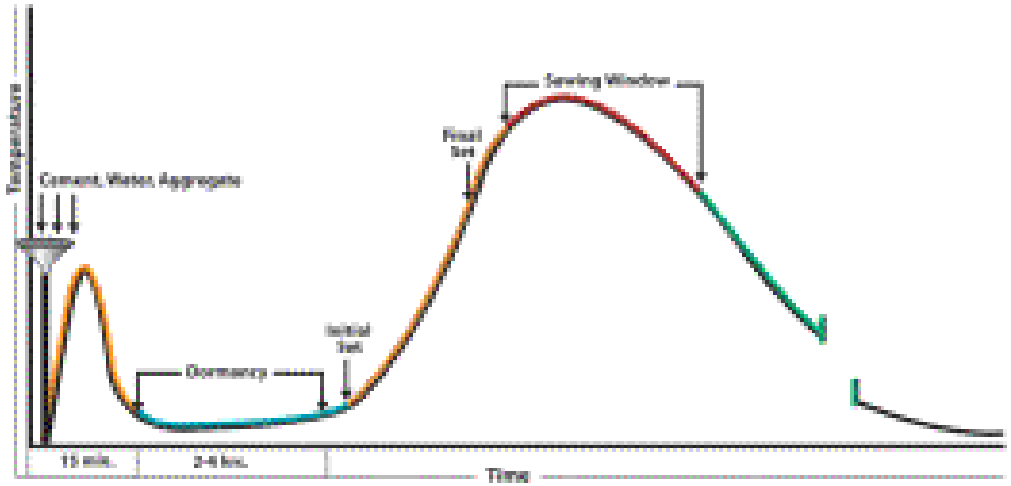
- 17 state pooled fund
- Industry
- FHWA

UNDERWAY

Mix Analysis

Integrated Materials & Construction Best Practices Manual

- CTL Group, PCA, ACPA
- FHWA
- Industry



UNDERWAY

Mix Analysis

Self-Consolidating Concrete for Slip-Form Paving

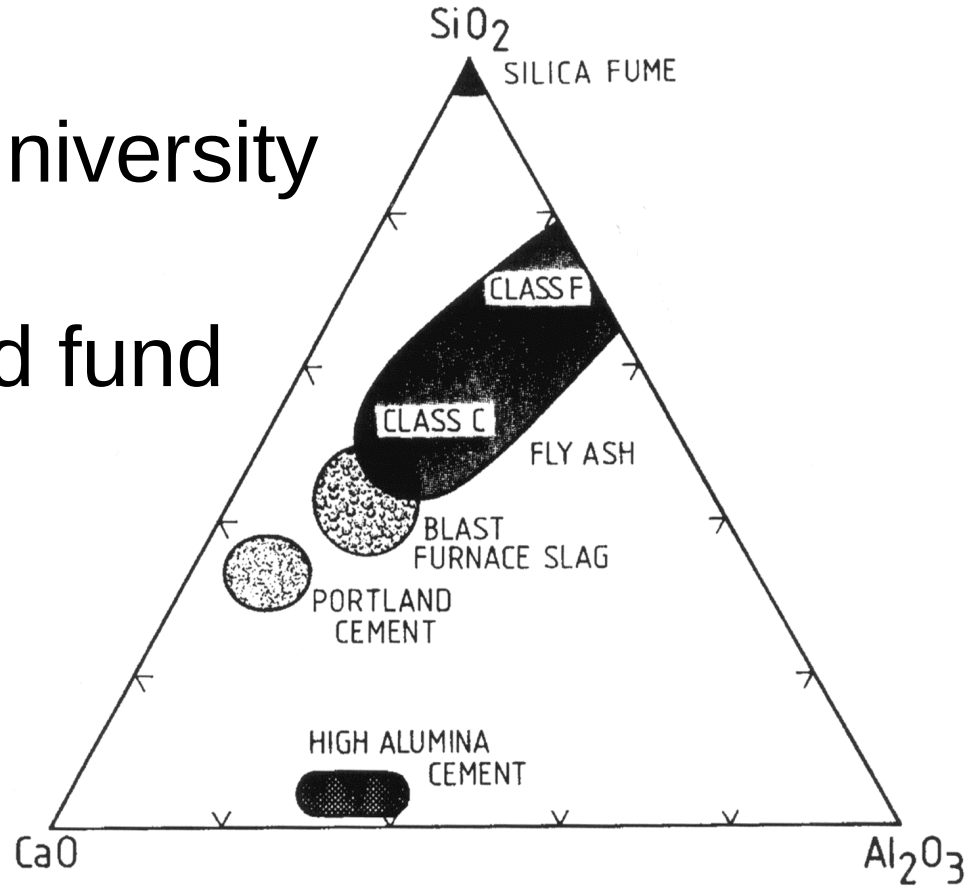
- ACBM (Northwestern University)
- FHWA
- 5 state pooled fund
- Industry

UNDERWAY

Mix Analysis

Ternary Mixes

- Penn State University
- FHWA
- 8 state pooled fund
- Industry



UNDERWAY

3. High-Speed NDT & Intelligent Construction Systems

- Continuous monitoring
- Improved production process
- Automatic recordation of quality control
- Feed to pavement management system

- Smoothness
- Thickness
- Consolidation
- Strength
- Curing
- Workability
- Steel location
- Texture

and more

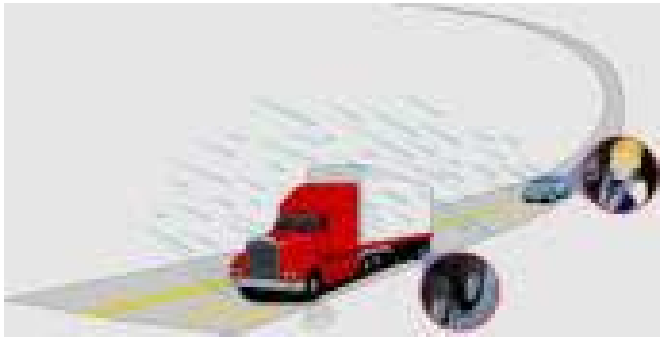
UNDERWAY

4. Optimized Surface Characteristics

Safe, Quiet and Smooth

Optimized conditions

- Friction
- Noise
- Smoothness
- Splash and spray
- Lateral drainage
- Light reflectance



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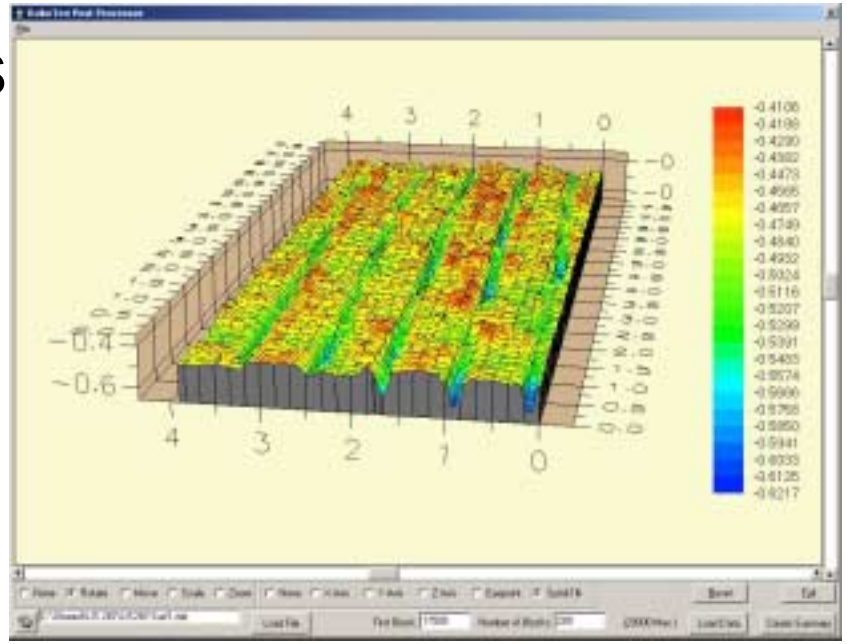
UNDERWAY

Surface Characteristics

Noise-Texture-Friction Program

- Strategic Research Plan
- Texture Experiments
- Innovation



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Surface Characteristics

- FHWA
- ACPA
- ISU
- IGGA
- Purdue

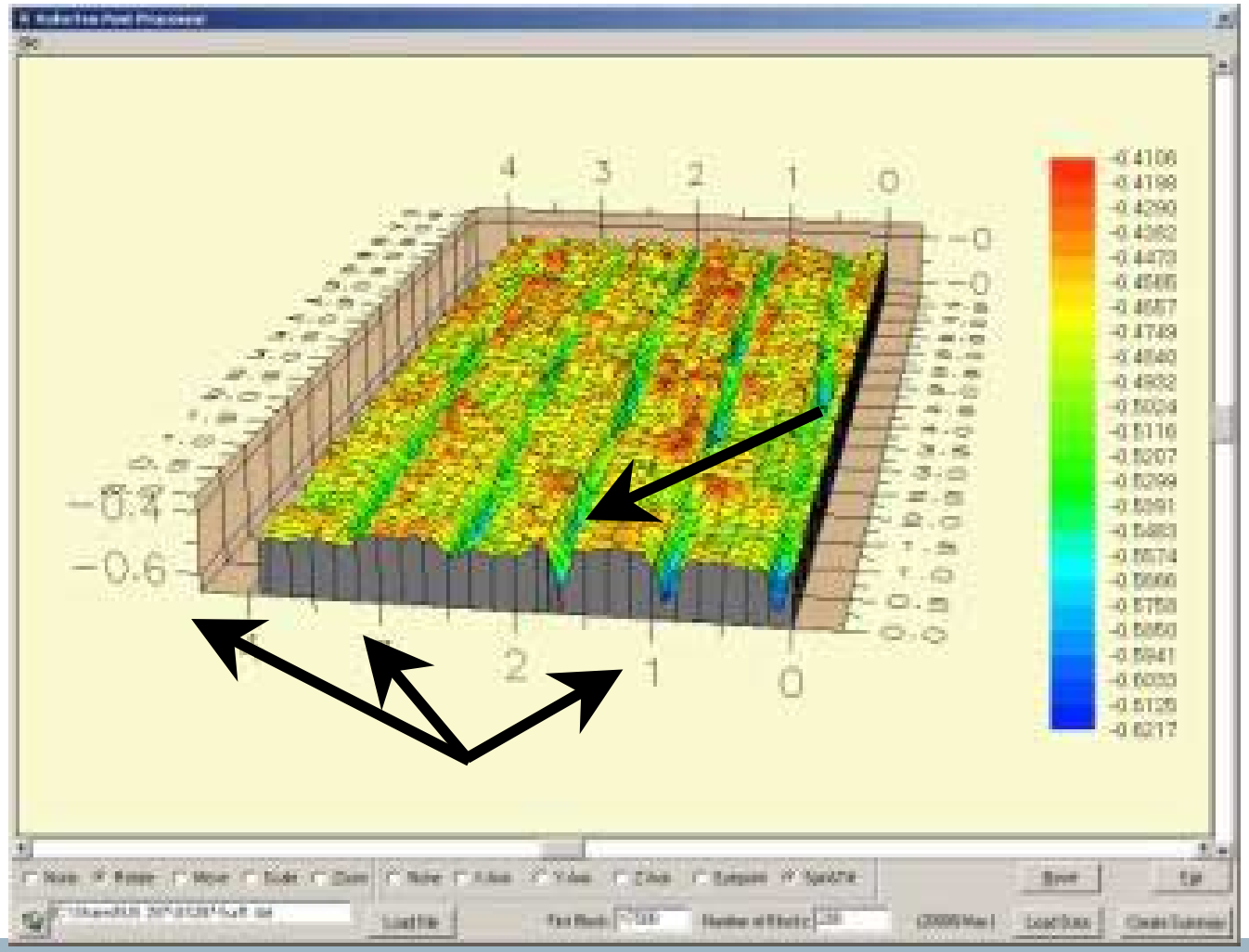
- TDC Partners
- Transtec Group

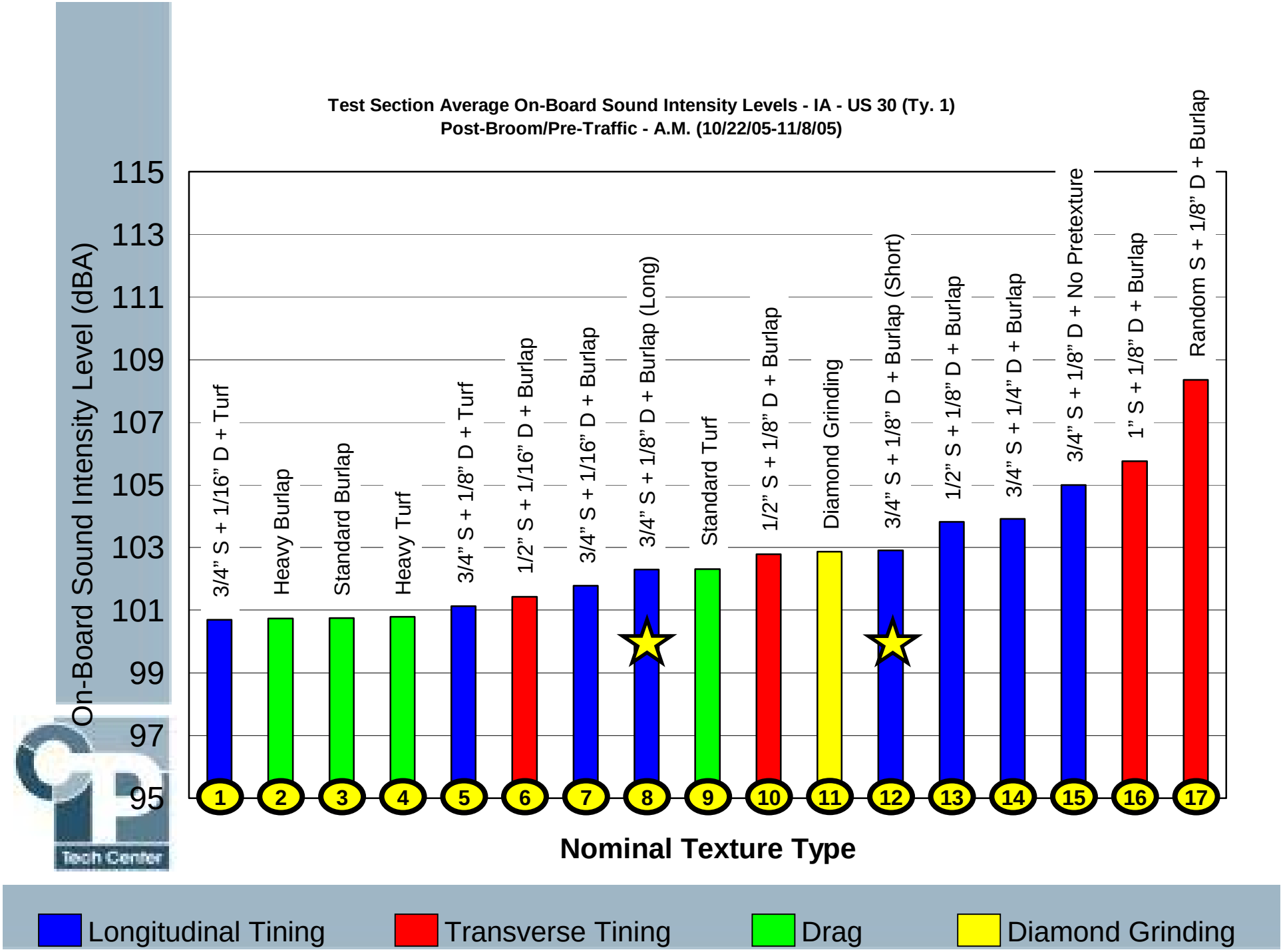
OBSI Noise Protocols

RoboTex Texture Device

RoboTex Texture Device

Surface 1: ¾” Longitudinal Tining




Test Section Average On-Board Sound Intensity Levels - IA - US 30 (Ty. 1)
Post-Broom/Pre-Traffic - A.M. (10/22/05-11/8/05)
On-Board Sound Intensity Level (dBA)
115
113
111
109
107
105
103
101
99
97
95
3/4" S + 1/16" D + Turf
Heavy Burlap
Standard Burlap
Heavy Turf
3/4" S + 1/8" D + Turf
1/2" S + 1/16" D + Burlap
3/4" S + 1/16" D + Burlap
3/4" S + 1/8" D + Burlap (Long)
Standard Turf
1/2" S + 1/8" D + Burlap
Diamond Grinding
3/4" S + 1/8" D + Burlap (Short)
1/2" S + 1/8" D + Burlap
3/4" S + 1/4" D + Burlap
3/4" S + 1/8" D + No Pretexture
1" S + 1/8" D + Burlap
Random S + 1/8" D + Burlap
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2
3
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5
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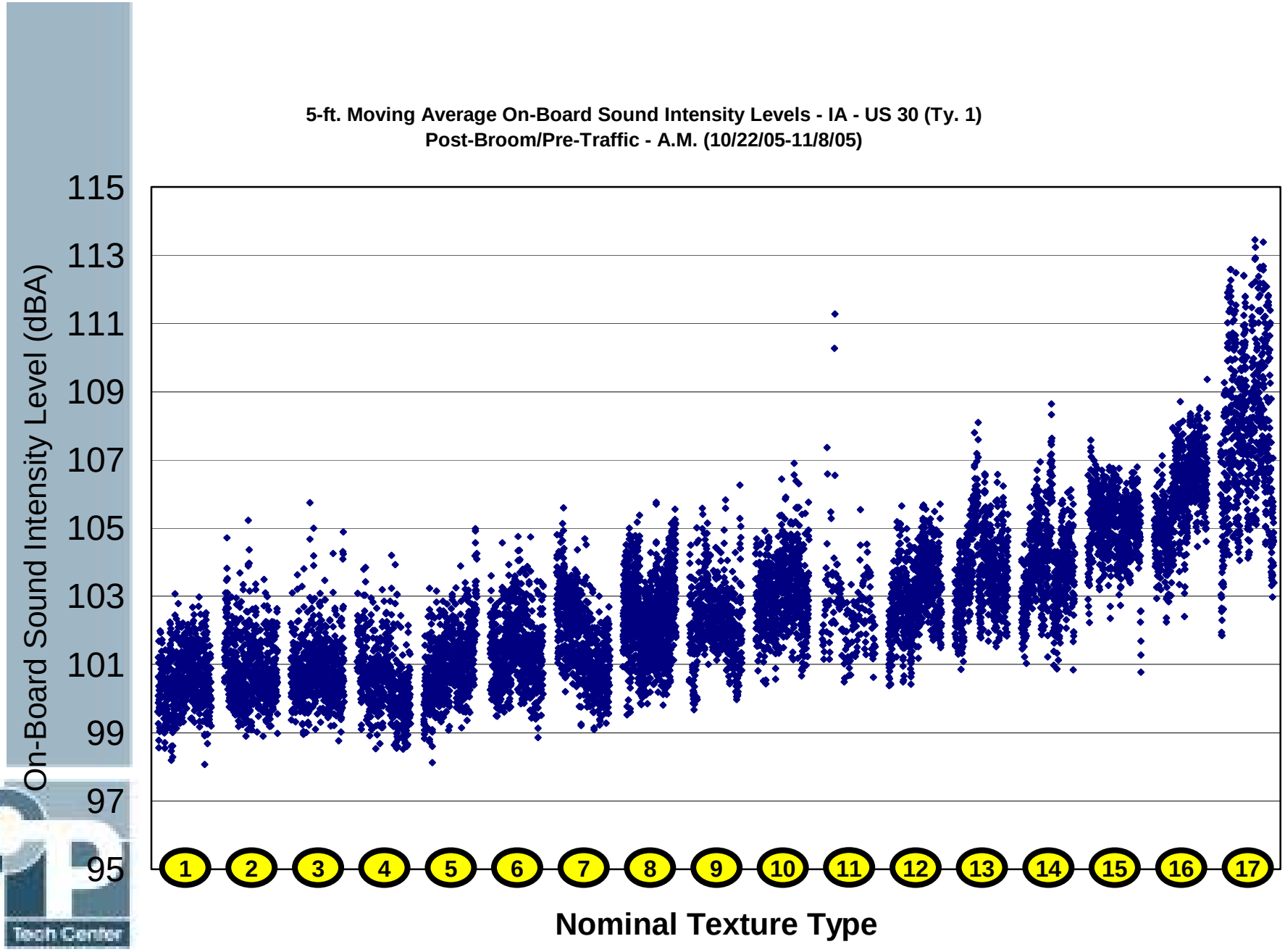
Nominal Texture Type
Tech Center
Longitudinal Tining
Transverse Tining
Drag
Diamond Grinding


5-ft. Moving Average On-Board Sound Intensity Levels - IA - US 30 (Ty. 1)
Post-Broom/Pre-Traffic - A.M. (10/22/05-11/8/05)
On-Board Sound Intensity Level (dBA)
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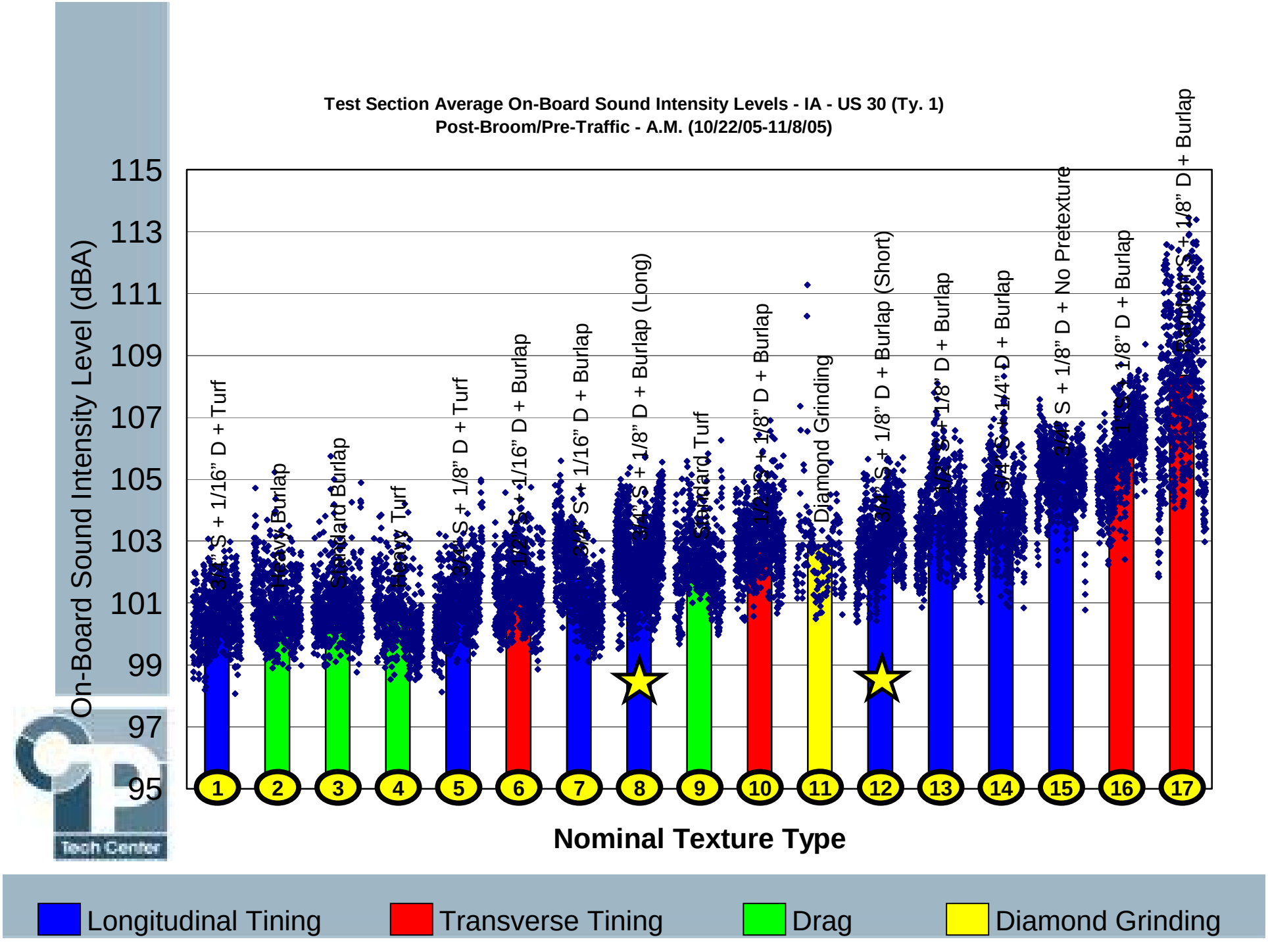
Nominal Texture Type


Test Section Average On-Board Sound Intensity Levels - IA - US 30 (Ty. 1)
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Standard Turf
1/2" S + 1/8" D + Burlap
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1/2" S + 1/8" D + Burlap
3/4" S + 1/4" D + Burlap
3/4" S + 1/8" D + No Pretexture
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Random S + 1/8" D + Burlap
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Nominal Texture Type
Longitudinal Tining
Transverse Tining
Drag
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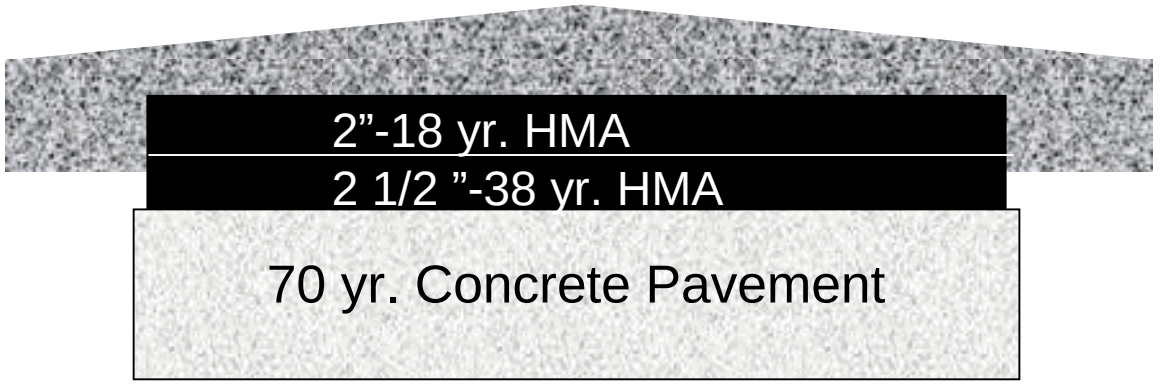
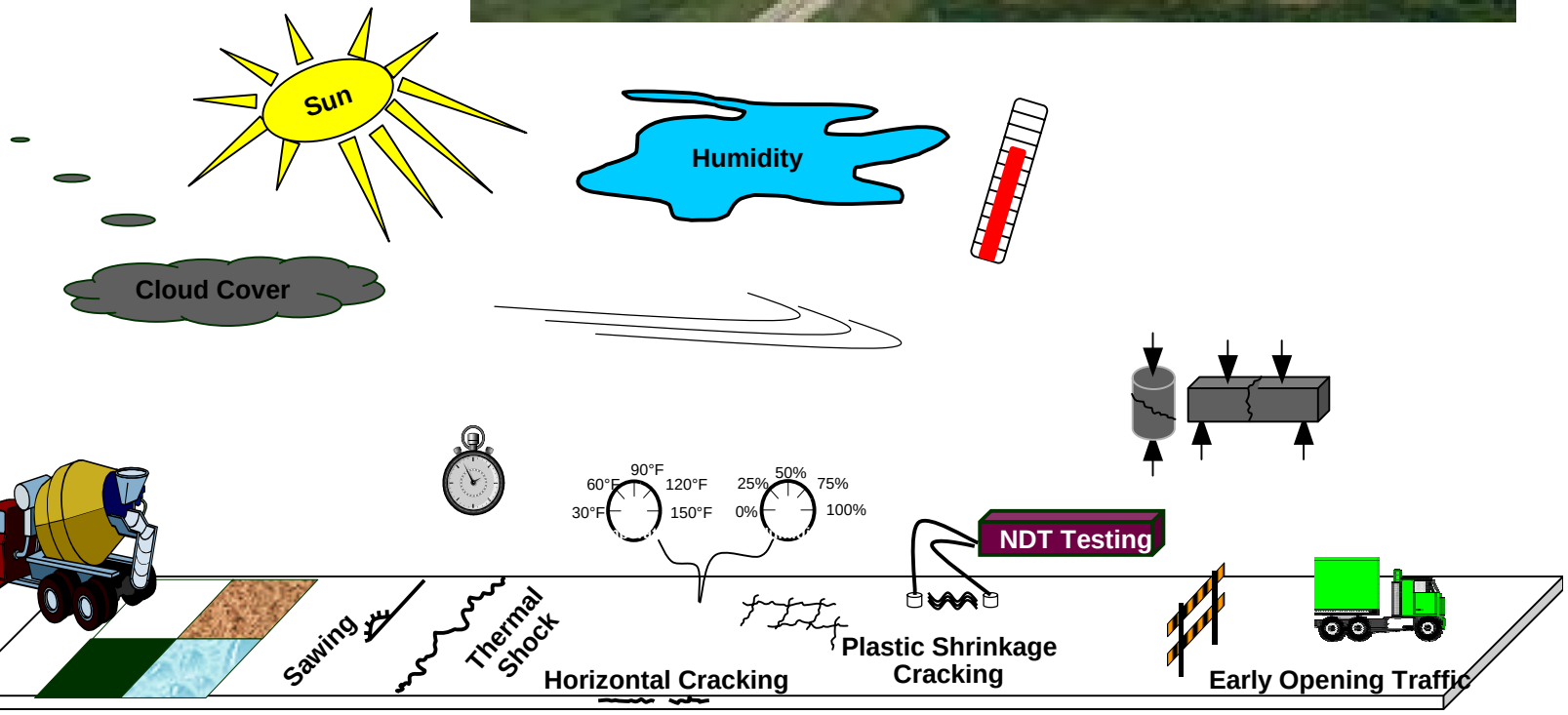
PCC Pavement Overlays

3 ½” PCC Overlay and Widening



UPCOMING

Long Life Pavements



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UPCOMING

CP Tech Center Vision

Virginia DOT

ACPA – MAC

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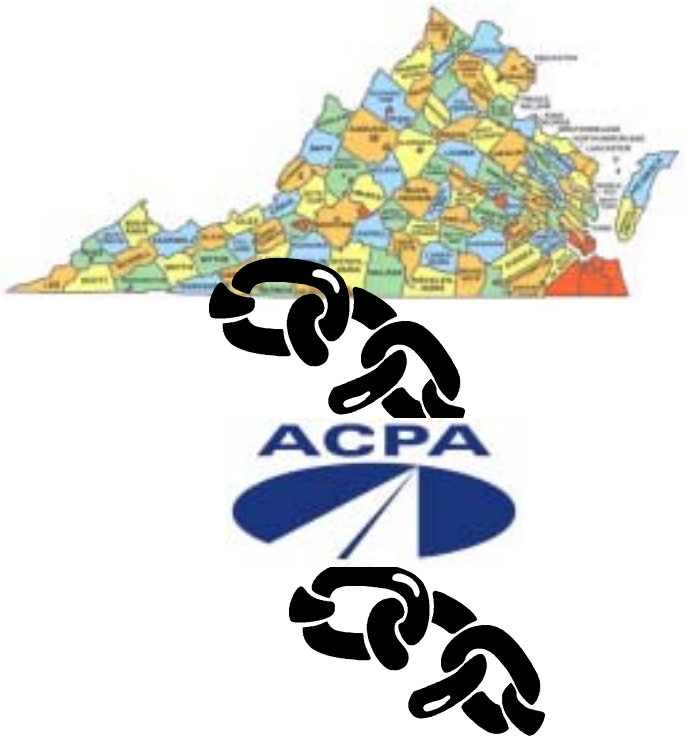

"Partners in the Future"

National Concrete Pavement Technology Center

National Concrete Pavement Technology Center

For more information,

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Center for Transportation Research and Education

Iowa State University

EXTRA SLIDES

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Iowa State University

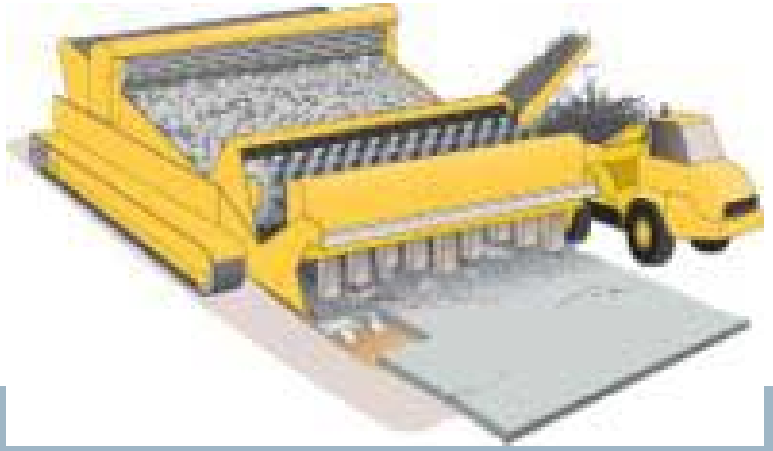
2. Performance-based Design Guide

- Beyond the AASHTO ME Guide
- All concrete design in one place
- Pavement preservation and restoration
- High speed computerized performance analysis

The Next Generation of Design

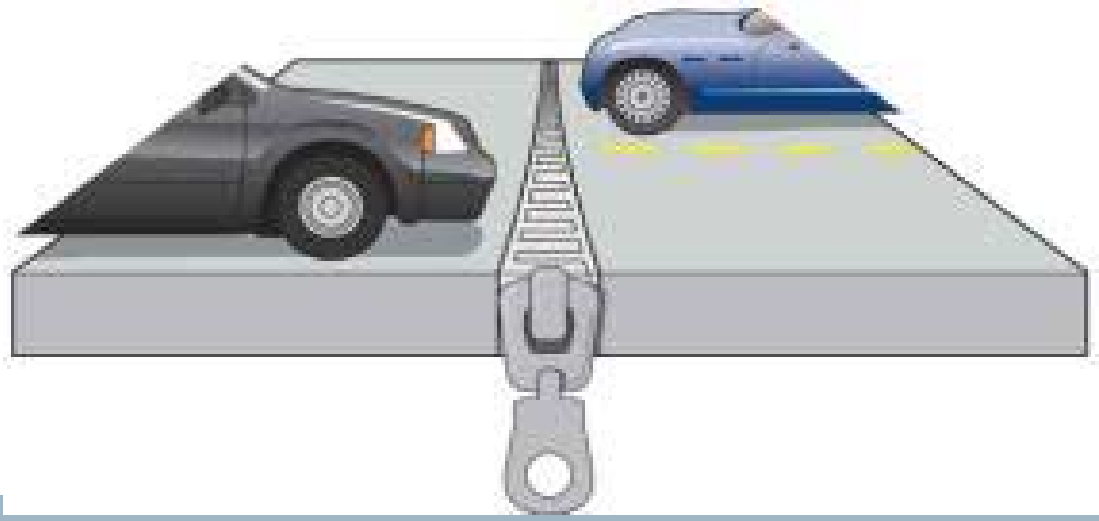
5. Equipment Automation and Advancements

- Next Generation of Construction Equipment
- Advanced batching
- From placement to curing to one-pass installation of drains
- Partnership with Equipment Manufacturers



6. Innovative Joints

- Cross cutting – from design to performance
- Incremental Improvement
- Breakthrough technology to supplement dowel technologies
- From Long Life Pavement to Thin Overlays



7. High Speed Rehabilitation & Construction

- From planning to computer simulation
- From slip form to pre-cast
- From minor recycling to one-pass remove and place pavement

Courtesy Transtec Group

Courtesy Ft Miller

8. Long Life Concrete Pavements

- From 30 to 50 years and beyond, with reliable and cost effective pavement solutions
- Improved designs
- Improved mixes
- Better joint designs
- Better approach to operational requirements

Three Approaches

- Major foundation and slab designed for no intrusion
- Major foundation and slab with rapid renewable surface course
- Major foundation - slab remove and replace and upgrade

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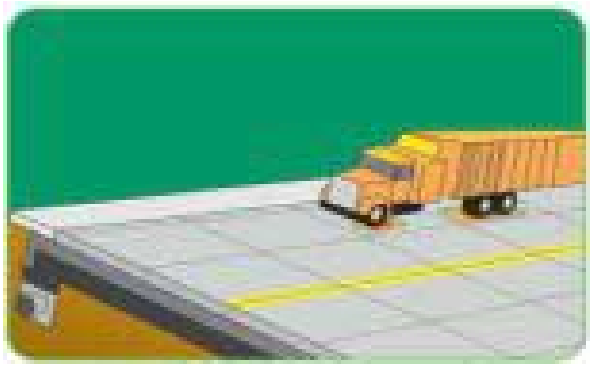
9. Accelerated & Long Term Data Collection

Accelerated testing; test roads, beyond LTPP, to collect, store and retrieve the next generation of pavement data accurately, quickly, and efficiently



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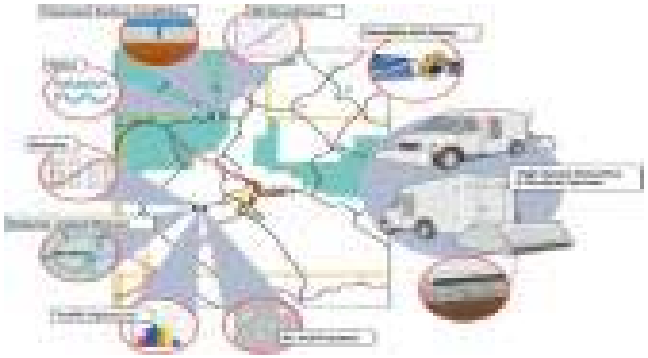
10. Pavement Performance

Can we get out there to measure our pavements anymore?

Pavement management and feedback systems, including sensors embedded in the pavement



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11. Business Systems and Economics

Roles and responsibilities and economic strategies for the future including innovative contracting, economics for various pavement solutions, sustainability, public-private partnerships and an new technology transfer system

12. Advanced Materials

From idea to lab to field to service to meet special conditions, environmental challenges, and faster construction